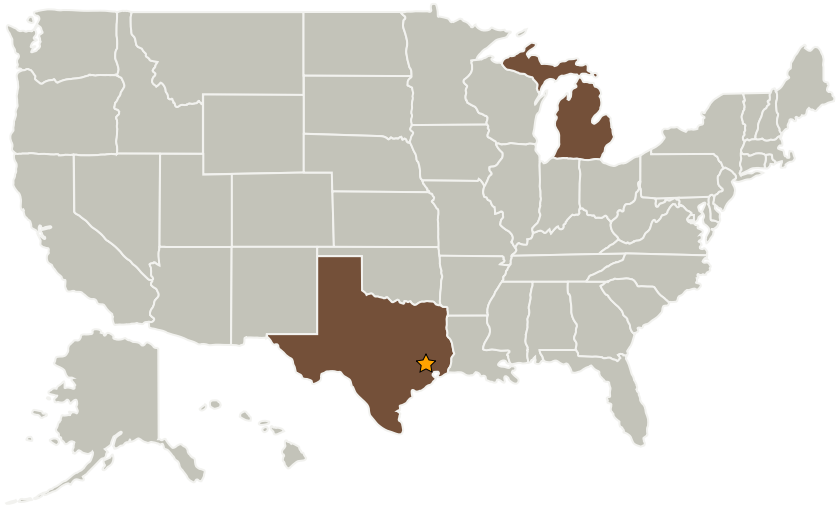
# 3-D Docking Sensor Algorithms, Phase I

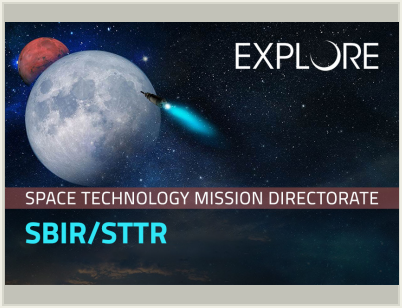
Completed Technology Project (2004 - 2004)

## Project Introduction

Michigan Aerospace Corporation has been funded by the Defense Advanced Research Projects Agency (DARPA) and Air Force Research Lab (AFRL) over the past several years to investigate on-orbit satellite docking and servicing technology. One of the key technologies required for all of those operations (rendezvous, docking, and inspection) is the sensor. For rendezvous and docking, the guidance sensor(s) must measure bearing angle, separation, closing rate, and the six degree of freedom (6-DOF) orientation between the two spacecraft. Currently, multiple sensors are required to measure these variables under limited dynamic conditions. Michigan Aerospace Corporation proposes to take one of the steps in establishing the feasibility of using the Sandia Scannerless Laser Radar (SLR) as an end-to-end rendezvous, docking and inspection sensor. This Phase I effort will focus on developing a methodology and preliminary algorithms for processing the range data to extract information about a target spacecraft, such as position, orientation and rates. Sensor performance requirements, hardware development and risks will also be assessed.

## Primary U.S. Work Locations and Key Partners



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## Organizational Responsibility

**Responsible Mission Directorate:**

Space Technology Mission Directorate (STMD)

**Lead Center / Facility:**

Johnson Space Center (JSC)

**Responsible Program:**

Small Business Innovation Research/Small Business Tech Transfer

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| Organizations Performing Work | Role | Type | Location |
|---|---|---|---|
| ★Johnson Space Center(JSC) | Lead Organization | NASA Center | Houston, Texas |
| Michigan Aerospace Corporation | Supporting Organization | Industry | Ann Arbor, Michigan |

| Primary U.S. Work Locations | |
|---|---|
| Michigan | Texas |

## Project Management

**Program Director:**

Jason L Kessler

**Program Manager:**

Carlos Torrez

**Principal Investigator:**

Pete Tchoryk

## Technology Areas

**Primary:**

- TX04 Robotic Systems
  - TX04.5 Autonomous Rendezvous and Docking
    - TX04.5.2 Rendezvous & Docking Algorithms